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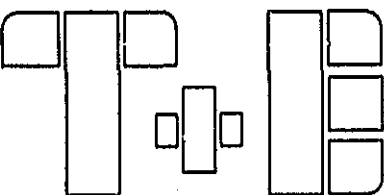
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Technology Applications Team

Annual Report

Contract NASW-3336 February 1981

Submitted to:

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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 INTRODUCTION	1
2.0 URBAN PROBLEM IDENTIFICATION	3
3.0 PROBLEM STATEMENTS	5
4.0 UPCOMING ACTIVITIES.	38
5.0 T+E TATeam MEMBERS	39
Table 1: PROBLEM STATEMENTS	6-a



Technology + Economics, Inc.
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March 3, 1981

Mr. Ray Gilbert
National Aeronautics and
Space Administration
Technology Transfer Division
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Washington, DC 20546

Dear Ray:

Enclosed is a copy of our annual report summarizing our first year activities. Pending your approval we will circulate it to other teams and the STTF facility. We would be glad to incorporate any changes you may recommend.

Sincerely,

Timothy Ballard

Timothy Ballard

TB:mi
Enclosure

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STTF

1.0 INTRODUCTION

Technology + Economics, Inc. (T+E), under contract to the NASA Headquarters Technology Transfer Division, operates a Technology Applications Team (TATeam) to assist in the transfer of NASA-developed aerospace technology. T+E's specific areas of interest are selected urban needs at the local, county, and state levels.

Under this contract (NASW-3336), T+E contacts users and user agencies at the local, state, and county levels to assist in identifying significant urban needs amenable to potential applications of aerospace technology. Once viable urban needs have been identified in this manner, or through independent research, T+E searches the NASA technology database for technology and/or expertise applicable to the problem.

T+E TATeam generic problem statements, circulated to all NASA centers, are the primary mechanism for locating relevant technology. The one page problem statements present a concise description of a significant urban need. The technology utilization (TU) offices at each NASA center distribute these problem statements to the appropriate areas or individuals, and relay comments or suggestions back to the T+E TATeam. The TATeam then coordinates any subsequent development or commercialization activities, working closely with both the NASA center and the potential user.

Secondary mechanisms for locating relevant NASA technology include searches of the NASA Tech Briefs publications, and computerized literature searches of the RECON database at the Scientific and Technical Information Facility (STIF). All TATeams recently received permission to access the RECON data directly, which should greatly facilitate the search process.

When NASA interest in a problem is secured, the T+E TATeam develops plans to adapt the technology to the user's specific needs, and subsequently to transfer the technology. This implementation process often includes performing market potential and business analyses, as well as securing co-funding commitments from user agencies.

This report summarizes the activities of the T+E TATeam during its first year of operation (November 1979 to November 1980). Significant start-up activities included forming working relationships with nationwide user agencies, linking up with existing communication networks in public problem areas, and establishing an effective mechanism for obtaining feedback from NASA technicians on specific problem areas. Each of these activities will be fully detailed in the following sections.

2.0 URBAN PROBLEM IDENTIFICATION

Between November 1979 and November 1980, the T+E TATeam invested a considerable amount of time and effort in identifying and contacting public agencies and private professional groups concerned with urban problems. As many of the groups had defined and categorized technical problems they encounter, these initial contacts will provide a valuable pool of identified problems for upcoming technology transfer efforts.

The following lists interest groups and government agencies contacted during the T+E TATeam's first year of operation.

Nationwide Interest Groups:

- American Public Transit Association
- Association of Metropolitan Sewerage Agencies
- Association of Public Works Directors
- Conference of Mayors
- Council of State Governments
- Intergovernmental Science, Engineering and Technology Advisory Panel (ISETAP)
- National Association of Counties
- National Association of County Park and Recreation Officers
- National Association of Governors
- U.S. League of Cities

Federal, State, and Local Agencies:

- Boston Gas Company
- California League of Cities
- California Office of Noise Control
- Cambridge City Council, Cambridge, MA
- Cambridge Water Department, Cambridge, MA
- Environmental Protection Agency, Municipal Environmental Research Laboratory, Cincinnati, OH
- Environmental Protection Agency, Municipal Research Laboratory, Edison, NJ
- Massachusetts Department of Environmental Management
- Massachusetts Department of Public Works
- Massachusetts Water Resources Commission
- Metropolitan District Commission, Boston, MA

The problems identified by these contacts were assessed by the T+E TATeam in terms of severity, extent, and potential solution. This process resulted in the preparation of the 23 problem statements discussed in the following section.

3.0 PROBLEM STATEMENTS

The selection of identified urban needs to be addressed in problem statements is based on three criteria. First, a solution to the problem must not be presently available in the commercial marketplace. Second, the problem must be amenable to a technical solution; it should not be inherently an administrative or funding difficulty. Third, the problem must be relatively severe and extensive; an isolated, one-time problem does not merit a major technology transfer effort.

Once selected, urban needs must be presented in a problem statement format designed to elicit solutions from NASA personnel. The problem definition procedure has the power to be an iterative, learning process. Feedback from the problem owner and NASA technologist serves to refine and redefine the problem such that a solution is possible. We have found that a broad generic problem definition is most likely to generate constructive responses from NASA.

Problem statements are designed to present the parameters of a problem in an objective, neutral fashion, allowing the reader to be as creative as possible in proposing solutions. It is therefore especially important not to constrain the level of the problem solution by suggesting a specific approach. For example, rather than state a problem as: "excavation walls must be restrained to prevent injury and death of workers who must work there", a greater range of possible solutions may be addressed by stating the problem as: "liquid waste must be disposed of without endangering excavation workers".

The T+E TATeam composes its problem statements on this systemic level to promote innovation and creativity to the greatest degree. Table 1 summarizes our problem statement activities to date. The pages following present a more detailed discussion of each problem and the progress made to date.

Table 1

PROBLEM STATEMENTS

Title	Date	Field Center Response
Radiant Heating for Thermal Comfort	3/80	LeRC
Local Energy Storage	3/80	LeRC
Locate and Seal Leaks in Lateral Sewer Lines	1/80	LeRC
Non-Toxic Catalyst for Sewer System Sealants	1/80	LeRC
Storm Sewer Discharge	3/80	--
Environmentally Safe Method of Ice Control	1/80	--
Aircraft Noise Reduction Retrofit Devices for Residential Buildings	3/80	MSFC
Noise Impact Testing for Local Public Schools	3/80	MSFC
Resource Recovery From Solid Waste	3/80	--
Simple, Cost-Effective Treatment for Organic Impurities in Municipal Drinking Water	4/80	--
A Method for Removing/Preventing Graffiti	4/80	--
Solid Waste Disposal Alternatives	4/80	--
Watershed Mapping	7/80	--
Structural Assurance of Older Buildings	5/80	MSFC
Cost-Effective Bus Lift and Access for Handicapped	5/80	MSFC
Road and Bridge Construction and Maintenance	7/80	--
Resource Recovery From Solid Waste: Energy Recovery Technology	7/80	--
Improved Sewer Line Sealant	8/80	--
Bridge Deck Protection	8/80	--
Locating Leaks in Landfill Liners	8/80	KSC
Vehicle Speed Control	11/80	--
Improved Sewer Line Packer	11/80	--
Simple, Cost-Effective Air-to-Air Heat Exchangers for Residential Buildings	11/80	--

Radiant Heating For Thermal Comfort

Problem

The use of radiant heating techniques can maintain thermal comfort on an energy efficient basis. However, there is a need for increased understanding of the physics and control aspects of radiant heating. Research opportunities exist in the areas of human comfort requirements, methods for achieving the desired radiant flux, and controls for radiant heating.

Field Center Response

A memorandum entitled "A Proposal to Minimize The Energy Required to Maintain Human Comfort" was received from Lewis Research Center (LeRC), Heat Transfer Fundamentals Section, which summarized some preliminary research on radiant heating techniques. The potential for realizing significant savings over conventional heating practices was demonstrated.

Activities to Date

T+E is presently seeking funding sources for and commercial interest in the problem. A more precise delineation of the research needed is also being conducted.

Planned Activities

Once the research and technology needs are defined more precisely and a sponsor is located, LeRC will be contacted regarding a possible project.

Local Energy Storage

Problem

There is a need for technologies and devices which will store electric energy in an efficient manner. This need stems from two phenomena. First, the demand on a utility for electric power varies considerably from hour to hour and day to day. The peaks and valleys in the demand schedule could be smoothed out using storage devices at a local or utility level. Second, there are various types of alternative power generation such as wind and solar which function on an intermittent basis, and require storage devices capable of supplying power in a reliable fashion. Utilities are actively investigating centralized energy storage, and interest at the local level is expected to become economically attractive.

Field Center Response

A description of the REDOX energy storage system, under development at LeRC was received. T+E TATeam member David MacFadyen subsequently visited LeRC and received a detailed briefing on the REDOX system. Ames Research Center (ARC) personnel indicated during our discussions that they were interested in installing a REDOX system in their proposed Advanced Technology Display House (ATDH).

Activities to Date

To assess the commercial market potential of the REDOX system, T+E proposed undertaking a detailed market study. A draft statement of work is currently under review by relevant personnel at LeRC. Discussions have also been held at ARC

regarding the incorporation of the REDOX system in their
ATDH; however, scheduling difficulties need to be overcome.

Planned Activities

Pending the outcome of the proposed market study, further commercialization activities will be undertaken. Potential users of the REDOX system to be contacted include utilities, large commercial and industrial electricity consumers, and manufacturers of local energy generating devices.

Locate and Seal Leaks in Lateral Sewer Lines

Problem

Lateral sewer lines between the building connection and main lines have been identified as a major source of leakage. Presently, there is no method of precisely locating and sealing these leaks; the whole line must be excavated and replaced at considerable cost. A technique is needed for locating and sealing leaks in these lateral lines, which are typically 4 to 6 inches in diameter. Remote TV camera equipment is available for use in larger main lines, but is not compatible with the small diameter and sharp bends of the lateral lines.

Field Center Response

A memorandum was received from a LeRC technician describing a possible technique using mildly radioactive isotopes for locating leaks.

Activities to Date

T+E located a radiation expert at LeRC, Dr. James Blue, who was interested in further development of the proposed solution. T+E also contacted the Environmental Protection Agency (EPA) Municipal Research Laboratory in Edison, New Jersey, and secured their interest in the problem. They indicated co-funding was available on a competitive basis, and forwarded the relevant applications materials to LeRC. However, Dr. Blue's status as a fulltime LeRC employee is presently under review.

Several metropolitan sewerage agencies have been contacted through the Association of Metropolitan Sewerage Agencies (AMSA). Each indicated a willingness to participate in any demonstrations or tests resulting from this project.

Visual methods of detection were also investigated including further miniaturization of existing closed circuit TV system and fiber optics technology. Dr. William Spack at the Jet Propulsion Labs (JPL) was contacted regarding these possibilities. However, the use of fiber optics technology to transmit visual images was found to be prohibitively expensive for sewer line inspection application.

Solid state vidicons (TV cameras on a silicon wafer) were also recommended. Research by T+E revealed that several types of miniaturized cameras, small enough for inspecting lateral lines, were available on the commercial market. Packaging and peripheral equipment would be needed to complete a working inspection system, however. Manufacturers indicated that the market for such devices is too small to justify development of a complete system.

To facilitate further feedback, this problem has been divided into two distinct areas. The first is the location of leaks, and the second is the remote repair of these leaks. A new problem statement on the latter was composed and is presently being circulated.

Planned Activities

Pending the resolution of Dr. Blue's employment status at LeRC, joint funding will be sought from the EPA and NASA-TU for the necessary development work. Tests of Dr. Blue's proposed system will then be carried out in conjunction with the EPA.

The development of a vidicon system for visual inspection has been assigned a lower priority due to the high costs of the necessary equipment (\$5,000 for the camera alone). However, should funding become available, JPL's expertise in vidicon systems will be solicited.

Non-Toxic Catalyst for Sewer System Sealant

Problem

Catalysts presently used with sewer grout and joint sealants are toxic to the workers who handle them. Substitute catalysts are actively being sought.

Field Center Response

A LeRC chemist, Mr. Walter Kim, wrote a memorandum describing possible alternative catalysts.

Activities to Date

T+E TATeam members met with a senior chemist for sewer sealants from the 3M Company in St. Paul, MN to discuss alternative catalysts. 3M had recently developed an alternative sealant, and was not interested in developing Mr. Kim's suggestions. The chemist indicated that the market for these sealants was quite small, and would not support many different product lines. He did, however, express a need for improved methods of applying existing sealants. This need has subsequently been circulated as a problem statement by T+E.

Efforts to secure Mr. Kim's membership on an EPA committee investigating sewer sealant catalysts have been unsuccessful to date, due to other demands on Mr. Kim's time. Sealant experts at Marshall Space Flight Center (MSFC) and JPL have also been contacted regarding possible alternative catalysts. No replies have been received to date.

With the information gained in these discussions, a more detailed problem statement was composed and circulated. No responses have been received to this second statement.

Planned Activities

Pending response to the new problem statement, no further activities on this problem are planned.

Storm Sewer Discharge

Problem

The storm sewer effluent in most cities is discharged untreated into outfalls. Although these storm sewer systems do not have nearly as large a pollution load as the sanitary sewer systems, they do contain contaminants that pollute water basins including coliform bacteria, oil, heavy metals, salt, sand, condensates from automobile exhausts, and many others. Techniques are needed to remove these contaminants from storm sewer effluent before discharge into outfalls.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

None

Planned Activities

None

Environmentally Safe Method of Ice Control

Problem

De-icing chlorides used on streets and sidewalks produces a host of undesirable side effects. Techniques or technologies are needed which ensure safe winter pedestrian and vehicular movement without contaminating water supplies or otherwise degrading the environment.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

A literature search of the RECON database failed to locate any relevant technologies.

Planned Activities

Ideas are still being sought from other sources for possible development by NASA. The undesirable effects of de-icing salts plague many urban agencies. Any mitigation of these effects would have widespread impact.

Aircraft Noise Reduction Retrofit Devices for Residential Buildings

Problem

Millions of American homes located near urban airports are subject to high levels of aircraft noise. There is a significant need for retrofit measures that will reduce noise levels inside the home. Some communities, such as San Francisco, are promulgating standards that will require soundproofing of all homes situated directly in airport flight paths. Techniques or devices are needed for soundproofing various components of houses such as walls, ceilings, windows, and doors.

Field Center Response

A memorandum was received from MSFC suggesting several techniques for reducing noise levels inside homes.

Activities to Date

T+E TATeam member Tim Ballard visited MSFC shortly after these suggestions were received. The participating MSFC personnel indicated they had very little available time to pursue development work. However, many of the suggestions were simple, recognized measures, requiring only adequate documentation and dissemination to effect widespread use. Various user agencies are being contacted again to solicit their sponsorship in the development of literature and/or materials on noise control.

Planned Activities

Specific project plans are now being formulated. Pending the identification of sources of co-funding and the receipt of a definite commitment from MSFC personnel, a Research Technology Objectives and Plans Report (RTOP) will be submitted.

Noise Impact Testing for Local Public Schools

Problem

There is a need for quantitatively identifying the sources and impacts of noise in the classrooms of primary and secondary schools in urban areas. Excessive noise levels are suspected to be a major impediment to the learning process. Testing to determine the effect of noise levels on short-term learning abilities is desired.

Field Center Response

A memorandum was received from MSFC describing the acoustic and non-acoustic factors that would have to be measured in any study addressing the problem.

Activities to Date

The agencies who originally specified the problem have since completed their joint study. However, more detailed data are still needed.

Planned Activities

Groups or agencies contemplating similar noise impact studies are being sought for possible application of the expertise located at MSFC.

Resource Recovery From Solid Waste

Problem

Significant amounts of materials could be recovered from the hundreds of tons of solid waste generated daily, if there was a cost-effective technique for separating the recoverable materials. Several prototype separation systems have been constructed which sort the stream item by item. As these prototypes have suffered from high cost and low throughput, improved techniques are needed. Any physical property such as density, ferro-magnetism, color, or hardness could be potentially useful in a waste separation system.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

Further research has been performed in the area of resource recovery from solid wastes, and several related problem statements have been composed.

Planned Activities

Continued efforts to solicit NASA involvement in this pressing problem area are anticipated. A visit to the Langley refuse-fired steam generating plant is planned to discuss technology transfer opportunities arising from this resource recovery work.

Simple, Cost-Effective Treatment for Organic Impurities in Municipal Drinking Water

Problem

EPA is currently setting standards to regulate the concentration of organic pesticides in drinking water supplies. At present, the most popular treatment method is activated charcoal, which is costly and of questionable effectiveness. Alternative treatment technologies for organics, which can be easily added to existing water systems at a reasonable cost, are sorely needed.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

Information has been gathered regarding commercially available water treatment systems.

Planned Activities

No further actions are planned unless field center interest is indicated.

A Method for Removing or Preventing Graffiti

Problem

Graffiti is seen as a significant problem by city, state, and local officials. In fact, it has reached epidemic proportions in some communities. There is need for a means of protecting buildings, signs, and vehicles from graffiti damage or of easily removing graffiti from these surfaces.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

As no responses were received, a search of appropriate databases has been initiated. To date, reports of several attempts to solve this or similar problems have been located, but none have resulted in proven, economical solutions.

Planned Activities

Given the low probability of success, no further activities are planned on this problem.

Solid Waste Disposal Alternatives

Problem

An alternative to traditional landfill techniques for solid waste disposal in sparsely populated communities is needed. The inability of existing solid waste landfill sites to handle the growing volume of wastes is compounded by political and environmental considerations which hinder the opening of additional disposal sites. Incineration (with or without energy recovery) is generally too expensive for smaller communities to undertake, and transportation costs limit the amount of pooling that is economically feasible. Economic, environmentally sound means to dispose of relatively small volumes of solid waste is desired.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

No further activities regarding this problem have been undertaken to date.

Planned Activities

Further research concerning solid and hazardous waste disposal is expected to result in the preparation of more detailed problem statements.

Watershed Mapping

Problem

There is a need for more accurate and economical methods of mapping the flow of ground and surface water. Watershed managers need to know the route of each watercourse to be able to intercept known sources of pollution before they reach the reservoir or water system. Presently, aerial photographs and on-site surveys are used. However, more accurate and up-to-date information is needed to ensure timely and effective control of municipal water supplies.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

Literature describing the present uses of LANDSAT imagery in water management was forwarded to the water department that originally specified the problem.

Planned Activities

No further activities are planned because remote sensing applications are handled by a different NASA division.

Structural Assurance of Older Buildings

Problem

There is a growing housing shortage in many cities. Older buildings which have been abandoned or defaulted could lessen this shortage if the structural integrity of these buildings could be verified. Testing and measuring techniques are needed to assess the quality of the plumbing and electrical systems, and to determine if the foundation and frame of the structure can withstand rehabilitation.

Field Center Response

A memorandum was received from MSFC describing two non-destructive test techniques commonly used by NASA that are potentially applicable to the problem.

Activities to Date

T+E TATeam member Tim Ballard visited MSFC and discussed the possibility of modifying the suggested techniques for use in testing. It was determined that considerable time and money would be required for successful adaptation of the techniques. Furthermore, personnel in the acoustics laboratory indicated that there is little time available for any development work for technology utilization purposes.

Planned Activities

T+E will conduct a cost-benefit analysis and market study to determine if the development expenses involved are justified. In addition, city development agencies will be contacted to locate possible sources of co-funding. Pending the outcome of these efforts, MSFC personnel will be contacted again regarding a possible development effort.

Cost-Effective Bus Lift and Access for Handicapped Problem

The handicapped access standards, as prescribed by Section 504 of the Rehabilitation Act of 1973, are difficult and costly for transit authorities to implement. Bus lifts for wheelchairs have been especially troublesome. Both installation and operation costs are very high, and the lifts are inconvenient to both the driver and the handicapped person. A safe, accessible, cost-effective design for these bus lifts is needed.

Field Center Response

A memorandum was received from MSFC outlining a comprehensive systems study addressing the bus lift problem. MSFC's capabilities in the relevant study areas were described.

Activities to Date

The Department of Transportation, Transportation System Center in Cambridge, MA was contacted as a possible source for the proposed study. They were not interested in funding a complete systems definition study, and felt that the commercial marketplace should respond to this need. An RTOP was therefore not submitted for this study due to the lack of co-funding sources.

Planned Activities

Commercial manufacturers of bus lifts will be contacted regarding possible applications of NASA expertise. Pending the results of these efforts, MSFC personnel will be contacted again.

Road and Bridge Construction and Maintenance

Problem

Several major government studies have indicated that the present state of road and bridge technology is woefully deficient. There is a significant need for improved materials and technologies for road and bridge construction and maintenance by the nation's highway departments. Principal causes of deterioration are increased traffic loads, increased weight of an average vehicle, and a critical lack of R&D funding. Durable, high strength materials are needed for a wide range of applications.

Field Center Response

No responses to this problem statement have been received to date.

Activities to Date

Further research concerning specific problem areas has resulted in the preparation of more detailed problem statements.

Planned Activities

As other specific problems in road and bridge construction and maintenance are located, separate problem statements will be written and circulated.

Resource Recovery from Solid Waste: Energy Recovery Technology

Problem

The burning of municipal wastes represents an untapped energy resource. However, traditional combustion systems are not tolerant of the low-quality fuels derived from municipal wastes. There is a need for better understanding of the combustion processes in garbage burning systems, and the development of combustion and heat recovery systems specifically designed for producing energy from municipal wastes. Increased slag formation, corrosion of boiler tubes, and increased particulate emissions are some of the more significant problems encountered.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

T+E TATeam members have been actively researching the field of energy production from municipal wastes. Discussions have been held with the Resource Recovery Branch of EPA, and relevant literature has been reviewed. Included in this review are state-of-the-art assessments of existing European and U.S. waste-to-energy conversion facilities. Several new, more detailed problem statements have been composed, and will be circulated shortly. A paper was written describing these facilities to serve as a reference for any NASA personnel interested in this area.

Planned Activities

T+E TATeam members will be visiting the Langley Research Center (LRC) to discuss technology transfer opportunities arising from their recently completed refuse-fired steam generating plant. When relevant NASA technology and expertise are located, industry interest will be solicited.

Improved Sewer Line Sealant

Problem

The problem statement entitled "Non-Toxic Catalyst for Sewer System Sealants", rewritten to incorporate additional information, sought to generate further NASA interest in the problem.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

Discussions with EPA revealed that their nationwide search to locate alternative sewer sealants identified very few candidates.

Planned Activities

Given the low probability of success, no further action is planned on this problem statement unless NASA provides further feedback.

Bridge Deck Protection

Problem

The de-icing salts used on the nation's highways corrode the reinforcing steel in concrete bridge decks. This greatly accelerates the deterioration of the surfaces. Bridges with an expected lifetime of 40 years require replacement after only 15 years of use. The General Accounting Office estimates the cost of these premature bridge replacements to be several billion dollars. A technique for stopping or slowing the salt induced corrosion of existing bridge decks is sorely needed.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

Discussions with NASA Headquarters revealed that the Stanford Research Institute (SRI) TATeam had also identified and circulated a similar problem statement on bridge deck corrosion. To avoid duplication of effort in this area, the SRI TATeam will exclusively pursue this problem. Any subsequent responses to the problem statement received by T+E will be referred to SRI for further development.

Locating Leaks in Landfill Liners

Problem

Landfill sites are usually lined with a suitable material to prevent leachate -- liquid that has percolated through the waste and is contaminated with dissolved or suspended materials -- from seeping into ground or surface water supplies. Although testing local water can reveal if a line is leaking, it cannot pinpoint the location of the leak within the landfill site. These leaks may be introduced during installation, or the liner may degrade over time due to adverse environmental effects. There is a need for in situ, non-destructive detection and location of leaks soon after they occur so that liner repairs and other corrective action can be taken immediately.

Field Center Response

An article was received from Kennedy Space Center describing a Ground Penetrating Radar (GPR), developed by a Kennedy contractor, for performing soil surveys. Kennedy engineers believe the GPR can be suitably modified to detect leaks in landfill liners.

Activities to Date

A letter expressing the interest of the Hazardous Waste Division of the EPA Municipal Environmental Research Laboratory in Cincinnati, OH in the GPR has been received. The Kennedy TU office, in conjunction with the T+E TATeam, is composing an RTOP to cover the development and testing expenses which are expected to be minimal.

Planned Activities

Pending the award of funds to prepare the GPR for locating landfill liner leaks, it will be transported to a site selected by EPA and tested against other devices developed under contract to EPA for this purpose. If the demonstration is successful, further commercialization plans will be initiated.

Vehicle Speed Control

Problem

Irresponsible motorists speeding through residential neighborhoods present a significant hazard to pedestrians, especially young children. In 1977, over 7,000 pedestrians were killed in motor vehicle accidents. Conventional methods of speed control such as warning signs, "speed bumps", and police presence are evidently insufficient to solve the problem. An innovative technology is needed to limit the speed of cars, trucks, and motorcycles in residential areas.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

No further activities have been undertaken regarding this problem statement.

Planned Activities

An on-line search of the RECON database for relevant technologies will be conducted when T+E obtains this capability in the early spring of 1981.

Improved Sewer Line Packer

Problem

This problem statement is a result of the redefinition and refinement of the problem statements entitled "Locate and Seal Leaks in Lateral Lines", and "Non-Toxic Catalyst for Sewer System Sealants". The ability to apply the sewer sealant material, whatever it may be, is distinct from the problems of locating the leak and of developing a suitable sealant. A remotely controlled device which could apply sealant or grouting materials inside sewer house laterals as small as four inches in diameter is needed.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

The EPA Municipal Research Laboratory in Edison, NJ was contacted, and supplied T+E with several EPA reports comprehensively summarizing available sewer line packers. These are presently being assessed to locate specific opportunities for the application of NASA technology.

Planned Activities

Pending the results of the review of available devices, NASA input concerning specific problem areas will be solicited.

Simple, Cost-Effective Air-to-Air Heat Exchangers for Residential Buildings

Problem

The lack of adequate ventilation can significantly deteriorate the indoor air quality in tightly built, energy-efficient houses. The exact effects of this indoor air pollution are still under investigation, but there is unanimous agreement that a certain amount of air exchange must occur in all houses. Active ventilation techniques can help achieve the minimum air exchange rate, and will not reduce the energy efficiency of the heating or cooling system. A device is therefore needed which will transfer heat between stale exhaust air and incoming outside air when used with active ventilation systems in residential buildings.

Field Center Response

No response to this problem statement has been received to date.

Activities to Date

T+E is actively researching many aspects of residential energy conservation, including the development of air-to-air heat exchangers. Under a separate contract, a state-of-the-art assessment of air-to-air heat exchangers has been prepared, and minimum air exchange rates for residential dwellings are being established. A manufacturer of sheet metal products has been located who is potentially interested in manufacturing air-to-air heat exchangers, but lacks an appropriate design.

Planned Activities

An on-line search of the RECON database is planned when this capability becomes available. T+E's research efforts in this field will be made available to any NASA center expressing an interest in the problem.

4.0 UPCOMING ACTIVITIES

Urban problem areas targeted for attention by the T+E

TATeam during the next year include:

- REDOX system applications, especially at the local, residential level.
- municipal water systems, especially maintenance and pollution monitoring.
- hazardous waste detection and disposal methods.
- energy recovery from municipal wastes including stack gas monitoring, corrosion prevention, and combustion modeling.
- alternative fuels development, biomass, and alcohol stills.

5.0 T+E TATeam MEMBERS

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